

研究论文

多性能指标约束的SoC软硬件划分算法

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摘要:

针对多性能指标的片上系统软硬件划分问题, 提出一种基于自适应混沌遗传退火的划分算法. 该算法以遗传算法为基础, 提出新的基于多约束条件的带不同比例惩罚项的目标函数, 利用混沌操作生成初始种群, 并引入自适应变异操作. 在种群个体趋于相似时, 采用自适应混沌策略优化适应度较差的个体; 对遗传操作后较优个体则采用退火策略进行优化. 仿真结果表明, 与模拟退火算法和遗传算法相比, 该算法获得的最低功耗在200个节点下分别降低了9.8%和4.7%, 在300个节点下分别降低了5.6%和4%.

关键词: 片上系统 软硬件划分 自适应混沌 遗传退火算法

SoC hardware/software partitioning algorithm for multi-performance index constraints

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Abstract:

A new partitioning algorithm based on adaptive chaotic genetic annealing is proposed to solve the hardware/software partitioning problem of System on Chip (SoC) on the multi-performance index. A new objective function with different proportions of punishment based on multi-constraints is presented in this algorithm which is based on the genetic algorithm. The chaos operation is employed to generate the initial population, and the adaptive mutation operator is adopted. Individuals with poor fitness are optimized by the adaptive chaos strategy as the population individuals which tend to be similar. The optimum individuals upon genetic manipulation are optimized by the annealing strategy. Simulation results suggest that the algorithm can reduce the least power consumption by 9.8% and 4.7% in the case of 200 nodes, and by 5.6% and 4% in the case of 300 nodes, respectively, compared with the simulated annealing algorithm and genetic algorithm.

Keywords: system on chip hardware/software partitioning adaptive chaos genetic annealing algorithm

收稿日期 2012-09-10 修回日期 网络版发布日期

DOI: 10.3969/j.issn.1001-2400.2013.05.015

基金项目:

国家杰出青年科学基金资助项目(60725415); 国家自然科学基金资助项目(60676009, 60902080)

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